

CALIBRATION STANDARD REQUIREMENT

FOR A

CHARGE/VOLTAGE

CALIBRATION STANDARDIZER

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PROCUREMENT PACKAGE

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CALIBRATION STANDARD REQUIREMENT FOR A
CHARGE/VOLTAGE CALIBRATION STANDARDIZER

1. SCOPE

1.1 Scope. This requirement defines the mechanical, electrical, and electronic characteristics for a Charge/Voltage Calibration Standardizer. This equipment is intended to be used by Navy personnel in shipboard and shorebased laboratories to provide charge to voltage conversion when performing charge sensitivity calibrations. For the purposes of this requirement, the Charge/Voltage Calibration Standardizer shall be referred to as the CVCS.

2. APPLICABLE DOCUMENTS

2.1 Controlling Specifications. MIL-T-28800, "Military Specification, Test Equipment for use with Electrical and Electronic Equipment, General specification for," and all documents referenced therein of the issues in effect on the date of this solicitation shall form a part of this requirement.

3. REQUIREMENTS

3.1 General. The CVCS shall conform to the Type II, Class 5, Style E requirements as specified in MIL-T-28800 for Navy shipboard and shorebased equipment as modified below. The use of material restricted for Navy use shall be governed by MIL-T-28800.

3.1.1 Design and Construction. The CVCS design and construction shall meet the requirements of MIL-T-28800 for Type II equipment.

3.1.2 Power Requirements. The CVCS shall operate from a source of 103.5V to 129V at 60 Hz $\pm 5\%$ single phase input power.

3.1.3 Dimensions and Weight. Maximum dimensions shall not exceed 19 inches in width, 3.5 inches in height, and 11 inches in depth. The weight shall not exceed 10 pounds.

3.1.4 Lithium Batteries. Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.

3.2 Environmental Requirements. The CVCS shall meet the environmental requirements for a Type II, Class 5, Style E equipment with the deviations specified below.

3.2.1 Temperature and Humidity. The CVCS shall meet the conditions below:

	<u>Temperature(°C)</u>	<u>Relative Humidity (%)</u>
Operating	10 to 30	95
	30 to 40	75
Non-operating	-40 to 70	Not Controlled

3.2.2 Electromagnetic Compatibility. The electromagnetic compatibility requirements of MIL-T-28800 are limited to the following areas: CE01, CE02, CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (back panel search excluded), RE02 (14 kHz to 1 GHz), and RS03.

3.3 Reliability. Type II reliability requirements are as specified in MIL-T-28800.

3.3.1 Calibration Interval. The CVCS shall have an 85% or greater probability of remaining within tolerances of all specifications at the end of a 12 month period.

3.4 Maintainability. The CVCS shall meet the Type II maintainability requirements as specified in MIL-T-28800 except the lowest discrete component shall be defined as a replaceable assembly. Certification time shall not exceed 60 minutes.

3.5 Performance Requirements. The CVCS shall provide the following capability as specified below. Unless otherwise indicated, all specifications shall be met following a 30-minute warm-up period.

3.5.1 Inputs.

3.5.1.1 Charge Input and Voltage Input. The CVCS shall have the charge input and voltage input at front panel with BNC connector isolated from chassis.

3.5.1.2 Mode Selection. The CVCS shall have the mode selection switch to select in charge or voltage mode of operation.

3.5.1.3 Mode Accuracy. The mode accuracy of the CVCS shall be a minimum of $\pm 0.25\%$.

3.5.1.4 Input Impedance. The input impedance of the CVCS shall be 1K megohm resistance shunted by 10 pF capacitance in voltage mode and 1K megohm resistance shunted by 10 microfarad capacitance in charge mode.

3.5.1.5 Dynamic Range. The dynamic range of the CVCS shall be as follows:

Voltage mode: Linear to 10 volts peak (all ranges).

Charge mode: 10,000 pC peak (lowest three sensitivity range)
and 100,000 pC peak (highest sensitivity range).

3.5.2 Outputs

3.5.2.1 Acceleration Velocity Displacement (A-V-D). The A-V-D output of the CVCS shall have a minimum of 1 V rms to represent acceleration, velocity, displacement as selected by a three pushbutton switch and a ten position scale range switch.

3.5.2.2 Acceleration. The acceleration output of the CVCS shall be normalized at 10mV/g and at 100 mV/g in rear panel BNC.

3.5.2.3 Velocity. The velocity output of the CVCS shall be normalized at 100 mV/in./sec. in rear panel BNC.

3.5.2.4 Displacement. The displacement output of the CVCS shall be normalized at 1 V/in. DA (Double Amplitude) in rear panel BNC.

3.5.2.5 Impedance. The output impedance of the CVCS shall be less than 100 ohms in series with 180 mfd for all outputs except the 10 mV/g output, which shall be 200 ohm output resistance.

3.5.3 Transfer Characteristics.

3.5.3.1 Sensitivity Selection. The sensitivity selection of the CVCS shall have four ranges and digital indication shall be provided in pC/unit (picocoulombs/unit) or mV/unit as follows:

0.500 to 9.999
05.00 to 99.99
050.0 to 999.9
500.0 to 9999.0

3.5.3.1.1 Sensitivity Accuracy. The CVCS's accuracy of sensitivity range shall not exceed $\pm 0.1\%$ on the lowest three ranges and $\pm 0.5\%$ on the highest range. The accuracy of four digit sensitivity selector shall not exceed $\pm 0.01\%$ full scale.

3.5.3.1.2 Sensitivity Resolution. The CVCS's resolution of four digit sensitivity selector shall be $\pm 0.01\%$ full scale or better.

3.5.3.2 Full Scale Ranges. The CVCS shall have a full scale range as follows:

Acceleration (g pk) and Velocity (in/sec.): selectable from
0.1 to 100 in a 1, 2, 5, 10 sequence.
Displacement: 0.01 to 10 in. DA.

3.5.3.2.1 Ranges Accuracy. The ranges accuracy of the CVCS shall not exceed $\pm 0.1\%$.

3.5.3.3 Frequency Response. The frequency response of The CVCS shall be as follows:

Acceleration: $\pm 0.25\%$ from 10 Hz to 5 kHz
 $\pm 0.5\%$ from 5 Hz to 10 kHz
Velocity: $\pm 1\%$ from 10 Hz to 2 kHz

$\pm 2\%$ from 5 Hz to 5 kHz
 $\pm 0.5\%$ from 5 Hz to 10 kHz

Displacement: $\pm 1.5\%$ from 10 Hz to 200 Hz
 $\pm 3\%$ from 5 Hz to 500 Hz

3.5.3.4 Linearity. The linearity of the CVCS shall not exceed $\pm 0.25\%$ of best straight line to 1 Vrms full scale condition at A-V-D output.

3.5.3.5 Distortion. The distortion of the CVCS shall not exceed 0.25%.

3.5.3.6 Hum and Noise.

3.5.3.6.1 Voltage Mode. The CVCS shall have the voltage mode less than 10 microvolts rms referred to the input on lowest full scale range.

3.5.3.6.2 Charge Mode. The CVCS shall have the charge mode less than 0.010 pC rms + 0.003 pC rms/1000 pF source capacitance referred to the input lowest full scale range.

3.5.4 Calibration.

3.5.4.1 Mode Selector. The CVCS shall have a three position switch to select the standard instrument operational mode; the Series mode to permit instrument calibration through a series 1000.05% internal capacitor when in the Charge mode of operation, and the Test mode to provide 1 Vrms full scale output independent of front panel control settings.

3.5.4.2 Oscillator Input. The CVCS shall provide the calibration oscillator input in the front panel to operate in the Series or Test mode.

3.5.4.3 Digital Calibration Comparator.

3.5.4.3.1 Frequency Range. The frequency range of digital calibration comparator shall be at least from 2 to 10,000 Hz.

3.5.4.4 Monitor Output. The CVCS shall provide the monitor output either reference or unknown input at rear panel BNC as determined by front panel pushbutton switch.

3.5.4.5 DC Output. The CVCS shall provide the 1.0 VDC output for 1.0 Vrms at switch selected input.

3.5.4.6 Digital Meter. The CVCS shall have 3-1/2 digit meter to read DC output voltage.

3.5.4.7 Output Filtering. The CVCS shall have the 3-pole low pass filtering, switch selectable for 2 Hz and 5 Hz operation. The output filtering shall provide less than 0.2% jitter in meter indication at the lowest frequency.

3.6 Operating Requirements. The CVCS shall provide the following capabilities.

3.6.1 GPiB Requirements. The CVCS shall have an IEEE-488.1 interface connector. The CVCS shall be tested for compatibility with the IEEE-488 bus and the John Fluke Model 1722A/AP instrument controller.

3.6.2 Front Panel Control requirements. All modes and functions shall be operable using the front panel controls. The locations and labeling of indicators, controls, and switches shall provide for maximum clarity and easily understood operation without reference to tables, charts, or flow diagrams.

3.7 Manual. At least two copies of an operation and maintenance manual shall be provided. The manual shall meet the requirements of MIL-M-7298.

3.7.1 Calibration Procedure. The manual shall provide a CVCS calibration procedure in accordance with MIL-M-38793.